Product Manual

TCS Basys Controls®

QWL3.0

Integrated Building Manager Panel

Description

The QWL3.0 is a low voltage panel with integrated communication gateway for communication with a central Ubiquity server, lighting time-clock and utility meter pulse transducer. The QWL provides a central panel configuration for mounting in a variety of locations.

Features

- Protective enclosure for controls and instrumentation
- Eight channel lighting schedules for interior and exterior applications
- Utility meter for monitoring of pulse transducer kW and kWh, gas, BTU and water.
- Integrated controller programming and scheduling
- Remotely upgradable firmware
- 365-day programming for each circuit
- Analog input for photo sensor with the ability to remotely adjust sensitivity level
- Digital photocell inputs
- Astronomical clock
- Remote or local override of each circuit
- External time clock or occupancy sensor input for each circuit
- LEDs for monitoring status
- No battery required for control parameters, schedules or clock
- Vanishing holidays
- Selectable normally open or normally closed relay on outputs
- Integrated Web Server with 1 GB of RAM and 80 GB of Storage Capacity
- Integrated 10/100 Ethernet controller with firewall capabilities
- Embedded simple interface to program and monitor the Controller Network
- Standard fallback alarming local to the device
- Energy Metering and Monitoring
- User definable communication cycles and packet sizes
- SSL (Secure Socket Layer) enabled web pages
- Integrated controller addressing
- Multi-port network capabilities
- Energy demand limiting and, curtailment (requires controller firmware 1.4 or later)
- ZigBee Wireless Gateway
- RS232-to-RS485 signal converter for hard-wired RS485 communications
- Built-in 2 Amp relays with hand/off/auto switches
- Supports all TCS Basys Controllers outputs

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Mounting

The QWL panel is designed for mounting using four #10-12 pan head screws. It is recommended to mount the panel to something of substance (i.e. wall studs, ply-wood, etc.).

Wiring

The QWL3.0 panel terminal designations are shown below.

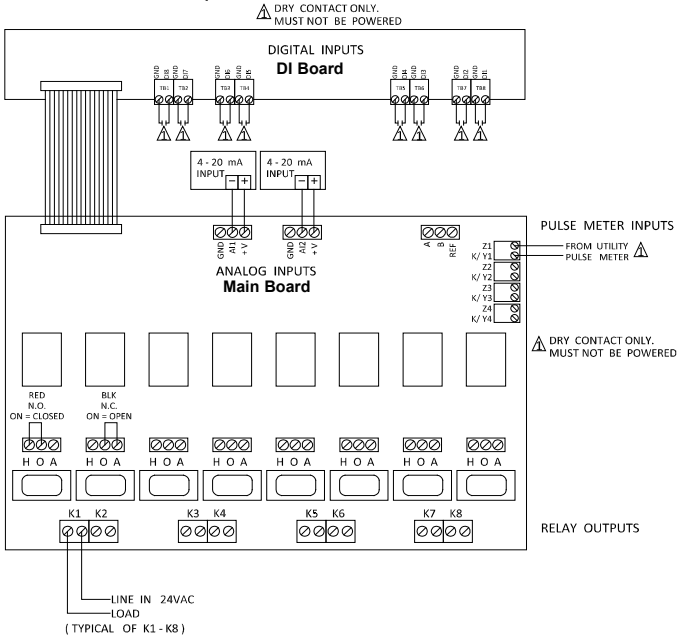
INPUT WIRING

The QWL3.0 panel accepts one 0 to 5 VDC input, one 4 to 20mA input, eight dry contact/digital inputs and 4 pulse meter inputs.

POWERING THE QWL3.0 PANEL

The QWL3.0 panel is powered from a 120VAC @ 60HZ to 12VDC power supply module.

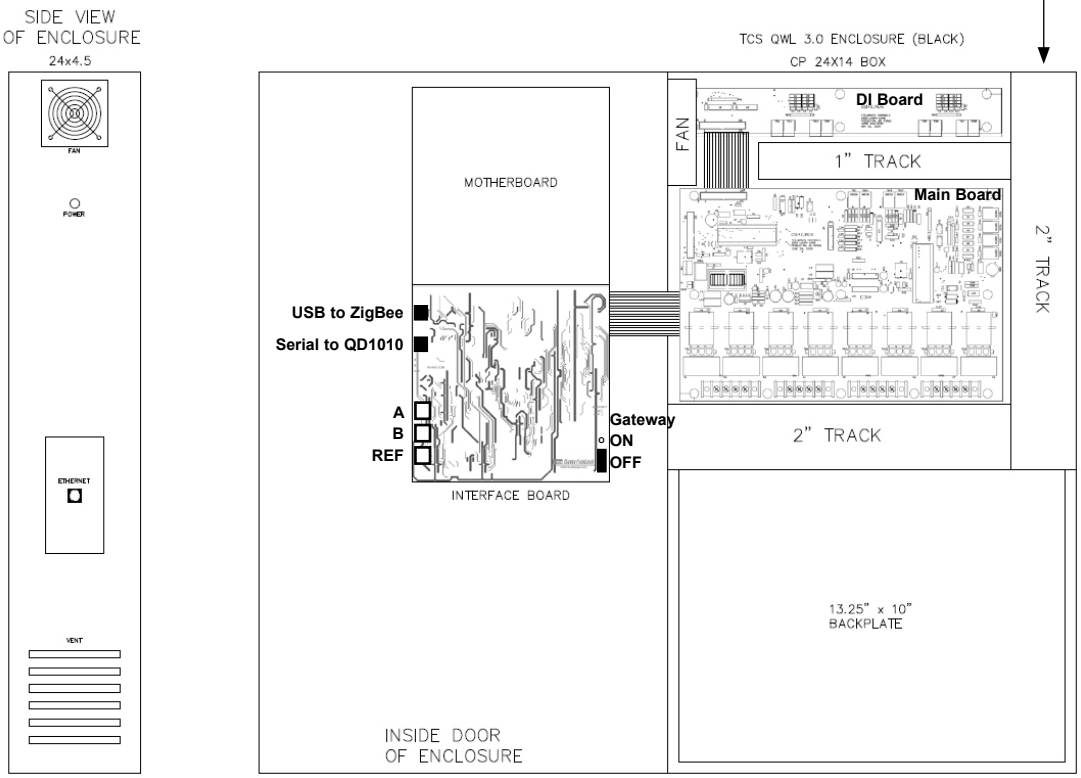
QWL3.0 PANEL WIRING


DRY CONTACT ONLY. MUST NOT BE POWERED
DIGITAL INPUTS
DI Board
4 - 20 mA INPUT
4 - 20 mA INPUT
ANALOG INPUTS
Main Board
PULSE METER INPUTS
FROM UTILITY PULSE METER
DRY CONTACT ONLY. MUST NOT BE POWERED
RED N.O. ON = CLOSED
BLK N.C. ON = OPEN
H O A
K1 K2 K3 K4 K5 K6 K7 K8
RELAY OUTPUTS
LINE IN 24VAC
LOAD
(TYPICAL OF K1 - K8)

NOTE: ***Any modifications to the QWL3.0 panel (including drilling out the EMT knock-out) will void the product's warranty.***

1" EMT Knockout for use with ¾" Conduit

QWL3.0 PANEL LAYOUT



Programming - Lighting Module

The lighting module portion of this panel is an SLQ218. It must be programmed if other than factory default settings are desired. The factory default address is 218.

CHANNEL EVENT SCHEDULING

There are up to two “ON” periods per day, and thus two time schedules (A and B). There are also up to eight independent channels (depending on model). Let us say that the “ON” time for a particular day is from 8:00AM to 12:00PM and from 1:00PM to 5:00PM. In the A schedule you could enter 8:00 to 12:00, and in the B schedule you could enter 13:00 to 17:00. You can reverse the A and B schedules also. You can also enter 8:00 to 17:00 for the A schedule and 0:00 to 0:00 for the B schedule. 0:00 (12:00AM) starts the day, and 24:00 (12:00AM) ends the day. “ON” times that span midnight have to be coordinated using two days' time schedules. Within the Ubiquity programming page, the desired schedule is simply selected from the drop-down menu for each channel. If the desired schedule is not shown in the drop-down, new schedules can be created or existing schedules can be edited on the Scheduling page.

Schedule
Rename Channel 1
Using Schedules: (NONE)
Enable Blink Output
Enable Astronomical Time
When Channel is ON, Relay is Closed
Rename Channel 2
Using Schedules: Main Schedule
Weekdays: 09:00 am - 05:00 pm
Saturday: 09:00 am - 05:00 pm
Sunday: 09:00 am - 05:00 pm
Edit Schedule
Enable Blink Output
Enable Astronomical Time
When Channel is ON, Relay is Closed
Rename Channel 3
Using Schedules: Main Schedule
Weekdays: 09:00 am - 05:00 pm
Saturday: 09:00 am - 05:00 pm

CHANNEL HOLIDAY SETUP

Holidays are created as part of the Scheduling page and will appear as part of the selected schedule. You can create date specific holidays, roaming holidays, or select from a list of standard bank holidays. If the selected schedule does not include the desired holiday(s), the schedule can be edited on the Scheduling page.

ENABLE BLINK OUTPUT

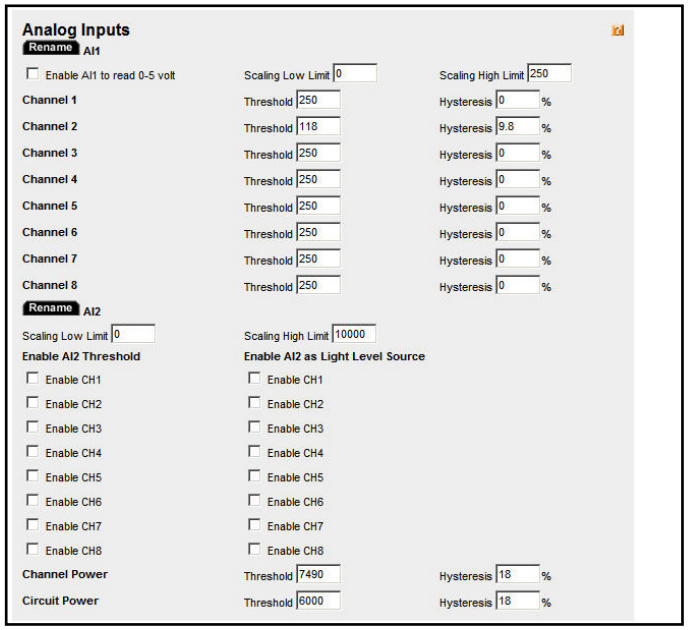
The Blink Output option forces the respective lighting output turn off and on, four times, five minutes prior to an unoccupied or off period. This will give an indication that a scheduled on time is about to end. Click the checkbox to enable this function for each channel.

ENABLE ASTRONOMICAL TIME

The Astronomical Time option allows the controller to turn a channel on and off based on the locations sunrise and sunset times. See the Astronomical Time section later in the manual for more details and additional configuration options. Click the checkbox to enable this function for each channel.

WHEN CHANNEL IS “ON”,…

You can select how you want the time clock output (Digital Output Mode) to behave when the channel is “ON”. You can choose for the Relay to be Normally Open (Off) or Normally Closed (On) during on periods. Simply select the desired behavior form the drop-down menu.


Analog Inputs
Rename AI1
Enable AI1 to read 0-5 volt
Scaling Low Limit 0
Scaling High Limit 250
Channel 1 Threshold 250 Hysteresis 0 %
Channel 2 Threshold 118 Hysteresis 9.8 %
Channel 3 Threshold 250 Hysteresis 0 %
Channel 4 Threshold 250 Hysteresis 0 %
Channel 5 Threshold 250 Hysteresis 0 %
Channel 6 Threshold 250 Hysteresis 0 %
Channel 7 Threshold 250 Hysteresis 0 %
Channel 8 Threshold 250 Hysteresis 0 %
Rename AI2
Scaling Low Limit 0
Scaling High Limit 10000
Enable AI2 Threshold
Enable AI2 as Light Level Source
Enable CH1
Enable CH2
Enable CH3
Enable CH4
Enable CH5
Enable CH6
Enable CH7
Enable CH8
Channel Power Threshold 7490 Hysteresis 18 %
Circuit Power Threshold 6000 Hysteresis 18 %

AI1 AMBIENT LIGHT INPUT

If using an ambient light sensor (0 to 5, 1 to 5V or 4 to 20mA), set the low and high scaling limits for AI1. These limits are what the light sensor reads at 10W limit and what the light sensor reads at full scale.

A Lighting Channel Threshold and Hysteresis for each of the available channels can be set for this input signal. For example, if the input is scaled 0 to 1000 lumens and you want to turn off one channel if the input gets up to 500 lumens and allow it to come back on if the input falls to 400 lumens, enter in 0 for the scaling low limit, 1000 for the scaling high limit, 500 for the threshold and 100 for the hysteresis for that channel.

Select a threshold and hysteresis for the channels which will be allowed to be shut off based on this input hitting the threshold. A common application for this feature is to control parking and exterior signage lighting. Essentially the channel will be on all the time it is occupied except when there is too much light. (Similar to the astronomical time function).

AI2 ENERGY POWER / INPUT

If using an energy meter, power meter or current transducer (4 to 20mA), set the low and high scaling limits for AI2. These limits are what the energy or power meter reads at 4mA and what the energy or power meter reads at 20mA.

Select a Lighting Channel Threshold for this input signal. Also select a Lighting Channel Hysteresis for this input signal. For example, if the input is scaled 0 to 10000 KW and you want to turn off some channels if the input gets to 7500 KW and allow them to come back on if the input falls to 6500 KW, enter in 0 for the scaling low limit, 10000 for the scaling high limit, 7500 for the threshold and 1000 for the hysteresis. You should choose this threshold to be larger than the equipment/device being turned off so it does not cycle on and off.

Select which of the available lighting channels will be allowed to be shut off based on this input hitting the threshold.

AI2 AMBIENT LIGHT INPUT

If AI2 is not used for power limiting, a second light sensor can be used to monitor another area. Set the low and high limits for AI2. These limits are the light sensor reading at 4mA and the sensor reading at 20mA respectively.

Click on the Enable box for each of the channels to be controlled by channel 2. Then proceed to setup the channel thresholds in the AI1 AMBIENT LIGHT INPUT box and make any desired changes. The channels that are checked as applying to channel two, will be applied to channel two in place of channel one.

CHANNEL CONTROL

Select whether you want the Digital Input DI1 and/or Override 1 to be Local or Remote. DI1 and Override 1 are used for Channel 1, DI2 and Override 2 are used for Channel 2, etc. Local means that the lighting module uses its own control program to manipulate these inputs. Remote means that it will take a PC to make any changes to these inputs. If the Digital Control is Remote for DI1, DI2, Override 1, Override 2, etc., you can select whether they are On or Off and force these inputs and outputs on or off from a PC.

Note - when doing this, the respective input will remain in that state indefinitely until you change it from a PC, or make the Digital Control Local.

There are three Digital Input Modes which can be used with a digital input: Regular, External Override & Momentary Toggle Override.

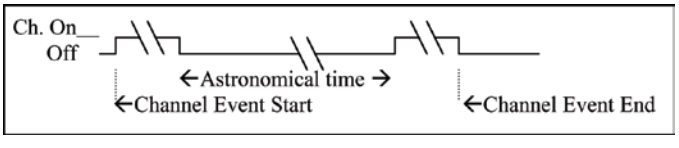
With Regular mode, the digital input is used in conjunction with the programmed schedule in determining when the relay output should be on or off.

With External Override mode, the digital input acts the same as the override button on the panel of the SL2108. The switch used for this type of digital input must be a momentary N.O. switch.

With Momentary Toggle Override, the digital input acts like a toggle switch. This must also be a momentary N.O. switch. If the time clock is on, pressing the switch turns it off, If the time clock is off, pressing the switch turns it on.

ASTRONOMICAL TIME

The Astronomical time function may be setup on any of the channels. It controls and turns off the enabled light channel for the daylight period form sunrise to sunset. The following diagram illustrates the typical application of this capability.



To setup astronomical time, enter the Latitude and Longitude parameters for the location being controlled. Also enter the time offset from GMT (Greenwich Mean Time). For example, the USA Central Standard time zone is offset -360 minutes from GMT. Madison, Wisconsin, USA is at 43° 5 minutes North (+) Latitude and 98° 30 minutes west (+) Longitude. The GMT Offset range is + 720 Minutes. Also click the box if applying daylight savings time to the astronomical time calculation.

Next, select the channel(s) that should have the astronomical time function and click the Enable box. This is done in the Schedule section of the page.

Note, for non-North American Daylight Savings time set the manual DLS (Day Light Savings) time.

CHANNEL OCCUPANT OVERRIDE

This is the number of minutes from 0 to 255 (4 hr, 15 min) which the controller will bring a system that is Off to On when its override button is pressed. This time can be different for each channel. You can also select whether the Override is Local (the controller manipulates these inputs/output) or Remote (the inputs/output are controlled through the software). If Remote is selected, you will also be able to chose the state of the override (ON or OFF). Note – when doing this, the respective Override will remain in that state indefinitely until you change it from a PC, or set the Override to Local.

HOLIDAY VANISHING

Choose whether to enable the Holiday Vanishing Feature. If checked, the controller will make the number of days for a holiday 0 after the holiday is over. This will keep the holiday from occurring in subsequent years if it is not reprogrammed.

DIGITAL INPUT DELAY/FILTER

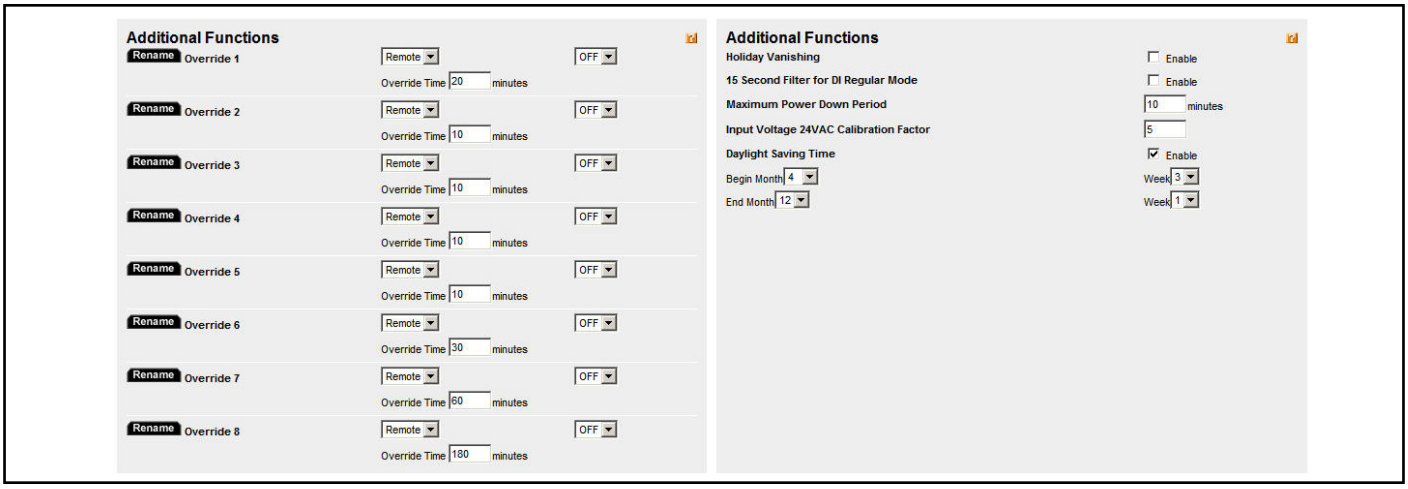
Enable the Digital Input Delay if you want the Digital Input to be present for 15 seconds before it takes effect. This can prevent cycling. Note, this delay if selected, will apply to all eight channels.

POWER DOWN PERIOD

If the controller loses power, it can remember which channels have been overridden and how much time is remaining in each override period. This is the amount of continuous power loss time in minutes where the controller will remember the override status'. If the controller loses power for longer than this period, the override buttons will have to be pressed again as necessary

INPUT VOLTAGE

The input voltage is monitored. The calibration factor is used to scale the controller's 24 VAC power input to the appropriate line voltage. For example, if the line voltage is 120 VAC and the SLQ218 power input is 24 VAC, then the calibration factor is 5.0. If the line voltage is 120 VAC and the controller power input is 27 VAC, then the calibration factor is 4.4 If the line voltage is 277 VAC and the SLQ218 power input is 24 VAC, then the calibration factor is 11.5.



DAYLIGHT SAVINGS TIME

Beginning in 2007, Daylight Saving Time (DST) in the U.S. will be extended by having an earlier change to DST in spring and a delay in switching back to standard time in fall. However, this change may only be temporary, as this "new" schedule is only in effect for a 2 year trial period. After that, the DST schedule may revert back, stay the same, or be something completely different. Products shipped starting in 2007 with firmware version 1.5 or higher accommodate the new DST schedule. Products shipped starting in 2008 with firmware version 2.0 or higher accommodate the new DST schedule and have the ability to be programmed to accommodate any future schedules that may be used. Should the schedule change and you need to customer program the DST start and end dates, simply enable the "Daylight Savings Time" option within the software and enter the starting month + week and the ending month + week.

BLINK OUTPUT

The Blink Output option forces the respective lighting output turn off and on, four times, five minutes prior to an unoccupied or off period. This will give an indication that a scheduled on time is about to end. Select whether to enable this function for each of the eight lighting channels.

CHANNEL MONITORING AND CONTROL

Select whether you want the Digital Input DI1 and/or Override 1 to be Local or Remote. DI1 and Override 1 are used for Channel 1, DI2 and Override 2 are used for Channel 2, etc. Local means that the lighting module uses its own control program to manipulate these inputs. Remote means that it will take a PC to make any changes to these inputs. If the Digital Control is Remote for DI1, DI2, Override 1, Override 2, etc., you can select whether they are On or Off and then Write or Write Channel, or Write All Channels and force these inputs and outputs on or off from a PC. Note - when doing this, the respective input will remain in that state indefinitely until you change it from a PC, or make the Digital Control Local.

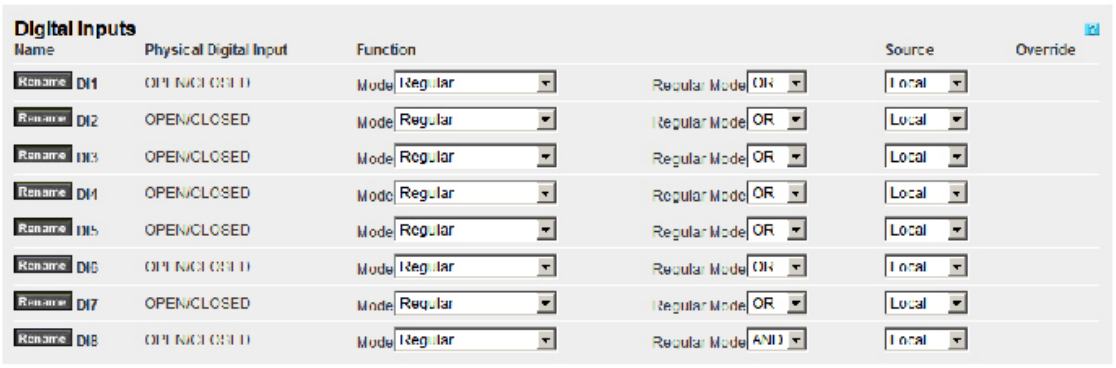
There are three Digital Input Modes which can be used with a digital input: Regular, External Override & Momentary Toggle Override.

With Regular mode, the digital input is used in conjunction with the programmed schedule in determining when the relay output should be on or off.

With External Override mode, the digital input acts the same as the override button on the panel of the SL2108. The switch used for this type of digital input must be a momentary N.O. switch.

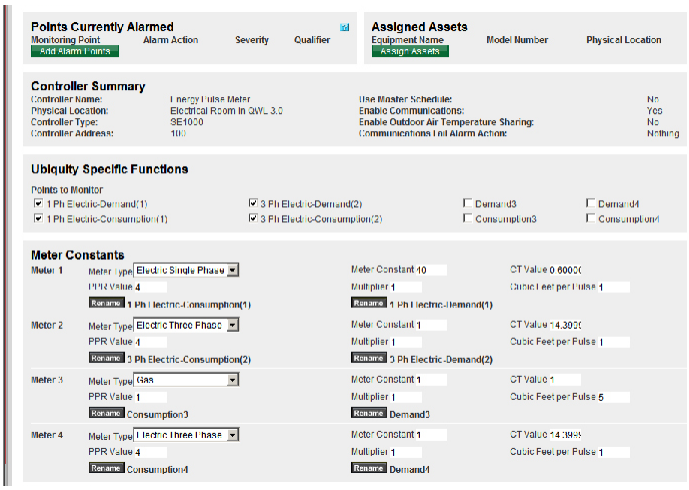
With Momentary Toggle Override, the digital input acts like a toggle switch. This must also be a momentary N.O. switch. If the time clock is on, pressing the switch turns it off, If the time clock is off, pressing the switch turns it on.

Select whether you want the time clock output (Digital Output Mode) to be Normally Open (Off) or Normally Closed (On) during on periods.



Programming - Pulse Meter

The utility pulse meter module portion of this panel is an SEQ100.



METER INPUTS

There are four meter inputs available. Each one is setup for a dry contact and cannot be changed. Each input (Meter 1, Meter 2, Meter 3 & Meter 4) can be configured to accept signals representing electrical, BTU, water or gas usage. The required parameters will be provided by either the utility company involved or on the current transducer (CT) used to generate the pulse signal.

METER TYPES

The SEQ100 supports various meter types. Selecting a meter type changes the default values as they are used to calculate meter consumption and demand for that particular meter. For each of the four SEQ100 meter inputs, there are five selectable options:

ELEC 1 PH: Electric single phase meter.

ELEC 3 PH: Electric three phase meter.

GAS: Gas meter.

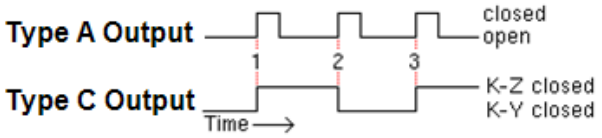
WATER: Water meter

BTU: BTU meter

Utility pulse meters can be one of two different types, depending on whether they count the leading and trailing edges of the pulse or only the leading edge of the pulse as a single count. A pulse output can be either a mechanical relay or solid state device. The pulse output corresponds to a unit/time of a monitored quantity. The amount of time between states of a pulse output corresponds to the meter demand and the number of pulses is proportional to the meter's consumption.

Below is a diagram depicting two types of utility meter pulse outputs. Meter Type A counts only the leading edge as a single pulse and the trailing edge is ignored. Meter Type C is known as a true KYZ meter and counts both the leading and trailing edges as a pulse, effectively doubling the number of pulses as seen by Meter Type A. The SEQ100 measures Type A output only; however, KYZ functionality can be mimicked by using a "Meter Multiplier" value of 2.

In the following picture, both Type A and C are shown. Three pulses are shown, labelled 1, 2, and 3. Notice how the Type A output closes and opens for each pulse, where the Type C output simply changes state.



If you have a Type C device (3 terminals KYZ), you will need to double the multiplier. The SEQ100 only counts the contact closures for the K and Z terminals. Doubling the multiplier will correct this problem.

PROGRAMMING THE METER CONSTANTS:

CT Value: The value of the CT wired to the meter. This value is usually provided on the CT or on the utility output meter. This value is only used for and electric meter.

P/REV: The Pulses per revolution for the meter. This value is usually provided from the utility company.

CONSTANT: The value of the constant for the meter is usually provided from the utility company and many times is located on the electric or gas bill.

CU FT/P: The value for Cubic Feet per pulse. This only applies to Water, GAS and BTU, and is usually found on the utility meter itself.

MULT: The multiplier for the meter can be used to scale the meter output or correct for KYZ meter. The multiplier is used to convert the pulses to engineering unit data. For example, if your meter provides one pulse per 0.01KWH, then a constant of 0.01 is required.

MULTIPLIER:

Each model of power meter is different and has a different multiplier. For example, if the meter is a Type A and reports 1/10 kWh per pulse, set the input multiplier to 0.1. If the meter is a Type C and reports 1/10 kWh per pulse, set the input multiplier to 0.2.

You must obtain the correct pulse multiplier from the meter manufacturer prior to configuring the SEQ100.

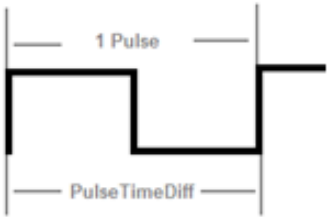
Some power meters have an option to configure the multiplier. Options often include 1, 0.1, 0.01, kWh per pulse. The best method to configure the pulse is to select the smallest multiplier available, considering the maximum load and pulse rate. To calculate the pulse rate, use the following formula:

Pulses = KW*3600*multiplier
Second

In general, the SEQ100 calculates electric meter consumption and demand as follows:

Demand = (CTValue*MtrConst*MtrMult)
(PPRValue*PulseTimeDiff)

Consumption = (PulseCount*CTValue*MtrConst*MtrMult)
PPRValue



The above diagram depicts how a single pulse and the pulse time difference are represented on a pulse waveform input into the SEQ100.

Modes of Operation

There are two modes in which the QWL3.0 can operate. One method is stand-alone server mode utilizing the embedded Ubiquity software. The second method is by directly communicating to a centrally hosted Ubiquity server. In stand-alone mode the QWL3.0 functions as the server to the controller network and can be accessed via the Internet, through a local or wide area network (LAN or WAN). All access methods utilize a simple web browser interface. The QWL3.0 may also be accessed via direct connection from a laptop using the included CAT 5 Crossover Patch Cable.

NOTE: Despite its appearance this is a unique cable designed especially for direct connections between two computers. Other Ethernet cables will not work.

The other method of operation for the QWL3.0 is to communicate directly to a centrally hosted Ubiquity server by connecting to the Internet or by connecting to a local or wide area network (LAN or WAN). By connecting to a centrally hosted server, the advantages of multi-site enterprise functionality is achieved. Enterprise features include: multi-site global programming, global scheduling, global alarming and enterprise data aggregation. In addition, some local control functions are still performed by the QWL3.0 (i.e. Loop control, energy curtailment, outdoor air sharing, etc.)

Initial Configuration

The QWL3.0 comes from the factory with a default mode of Stand-alone and with a special setup mode enabled. This setup mode is called 'Setup DHCP Server'. In this mode the QWL3.0 acts as a DHCP server of setting up the QWL3.0 by simply connecting to it with a laptop or desktop PC. **Caution: The** QWL3.0 **comes programmed with a default setup mode and functions as a DHCP server. When setting up the unit, be sure it is not connected to another DHCP enabled network.**

Before connecting the QWL3.0 to a LAN or WAN, you must first configure the unit for operation. To configure the unit, connect it to a PC or laptop that is NOT connected to a network during the configuration process. Make this connection from the Ethernet port of the unit to the Ethernet port of the PC using the CAT 5 crossover Ethernet cable included. After you have made the connection from the QWL3.0 to the PC, power up the unit and wait 3 minutes for the unit to completely boot up. You then need to reboot your laptop or PC to allow it to be assigned an IP address from the unit. Open the web browser program (Internet Explorer v5.0 or higher is the recommended browser). In the browser address space, type in IP address http://192.168.1.1 and press enter to navigate to the unit login page. Enter username: **admin** and password: **password** to reach the Ubiquity site home page. From this page you can configure the operation mode of the QWL3.0 (See Setup & Programming section) by navigating to the following links at the top of the home page Admin > QD2040 Setup. You can now change various parameters or link to the control addressing page to address controllers, that do not have displays, prior to installation. (See Control Addressing section) After configuration is complete, disconnect PC from the QWL3.0. It is now ready for installation.

Prior to Connection to Network

For Internet operation decide how the QWL3.0 will connect. The QWL3.0 can connect to the Internet using a broadband connection (Cable or DSL) or through a LAN.

Ethernet When connecting to a centrally hosted server utilizing the Ethernet port outside of the local or wide area network, it is necessary to verify, with the network administrator, that the proper communication ports are open through the corporate firewall (typically Port 80).

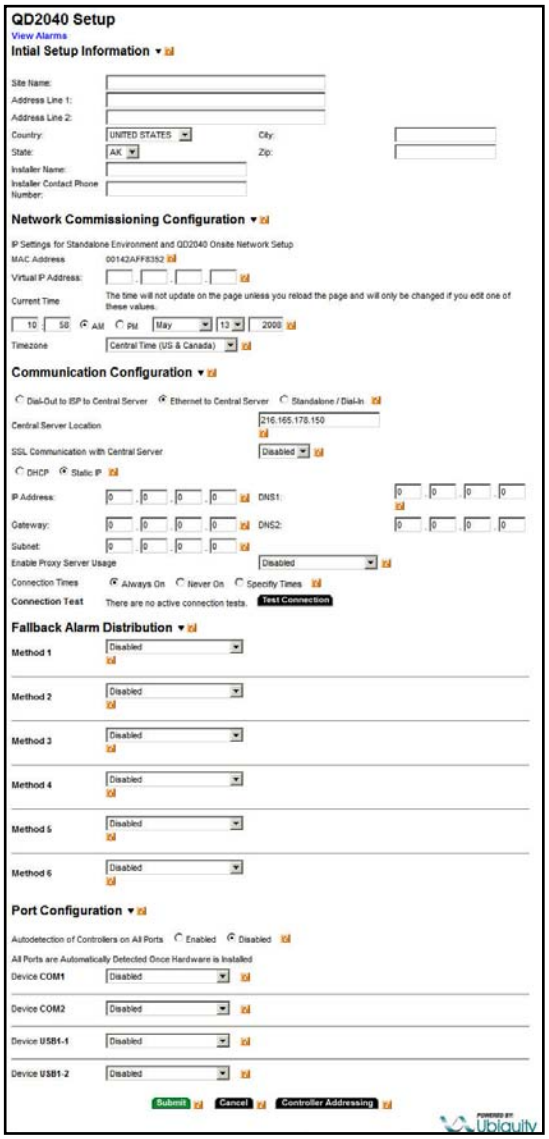
Stand-alone

When operating in stand-alone mode, it is necessary to establish the URL for the QWL3.0. This is accomplished by utilizing either static or DHCP IP addressing. It is necessary to determine if the unit will be accessible over a network and if so will it utilize DHCP or static IP addressing. When using static IP addressing, it is also necessary to establish the Gateway, Subnet and DNS protocol setting for the unit. This will need to be done by the LAN/WAN network administrator prior to installation. When utilizing DHCP addressing, the IP address settings are automatically assigned when communication is established.

When operating in communication to a centrally hosted Ubiquity server through an Ethernet connection, the QWL3.0 supports both static and Dynamic Host Configuration Protocol (DHCP) IP addressing. When using static IP addressing, it is also necessary to establish the Gateway, Subnet and DNS protocol settings. The IP protocol settings will need to be established by the LAN/WAN network administrator prior to installation. When utilizing DHCP addressing, the IP address settings are automatically assigned when communication is established. Configuring the QWL3.0 for DHCP is outlined in the Programming Setup section.

Controller Network Setup

All controls connected to the network will need to be programmed with the same communication baud rate as well as a unique communication address from 0 to 255, excluding 248. On units with displays, this can either be done from the face of the controller using the keypad and display or by individually direct connecting controllers to the QWL3.0. On units without displays, controller addressing is done by direct connect to QWL3.0. (see Control Addressing section)



RS485 Network Wiring and Setup

To access your controllers through Ubiquity browser software, you will need to create an "RS485" network by connecting all of the controllers "A" terminals together, "B" terminals together and REF together, using 18 or 20 AWG, 120 ohm impedance, twisted, shielded 3 conductor (triple) wire.

If a port has more than 64 Controllers or is longer than 4000 ft., you will need a bus repeater, QD1011a or use the built-in ZigBee wireless network (limit of 15 wireless units). You will need an additional bus repeater for each wired group of 64 units.

When connecting controllers on a network, you may use any wiring configuration (i.e. "daisy chain", "star", etc.), as long as all "A" terminals are connected together, all "B" terminals are connected together and all “Ref” terminals connected together. The integrity of the "A", "B" and “REF” wiring runs must be maintained or the network will not communicate properly. Also, a 120 ohm terminating resister should be installed at the farthest end of the network (one is already built-in on the QWL3.0),

CAUTION: You must maintain proper polarity of "A", "B" and "REF" connections. All shields must be tied together, taped off to prevent any accidental connections then grounded at one end of the network. Caution should be taken to avoid running wire near power wires, frequency drives, fluorescent lights, ballasts, etc., which can all compromise the communications signal. Care should also be taken to leave as little wire exposed as possible.

Critical: Avoid noise on the communications line by grounding the shield. The signal that passes information is 1 to 5 V. If you measure across A and B, you should get 0 VAC, and 1 to 4 VDC. There should be 0 VAC and 0 VDC between either A on B and the shield. If you are getting more than this, check for runs against high voltage, for exposed wires, to see if grounding at only one side, or that you have used dedicated power for the controllers or if you have reversed power on a Controller(s).

NOTE: By using wire cable consisting of one triple of twisted shielded wire and one pair of unshielded wire, you can run power to controllers and run communications wire in the same cable. Part # PM2000A

NOTE: Be sure to check any local codes to confirm the wire choice meets the code.

The QWL3.0 includes one QD1010 RS232/RS485 communications converter that is attached directly to the serial port and one ZigBee coordinator that is attached directly to the USB port. The controller network wiring connects to the "A", "B" and "REF" terminals on the main board. If using more than one port on the QWL3.0, additional QD1010 devices will need to be used (one per port). When connecting to the USB ports, a PI1000 USB/Serial Converter is required to connect the QD1010 to the USB port of the on the back of the unit. Up to 64 controllers can be placed on a single port of the QWL3.0. Additional USB ports may be provided by the use of a multi-port USB hub attached to the built-in USB port on the unit.

Setup & Programming

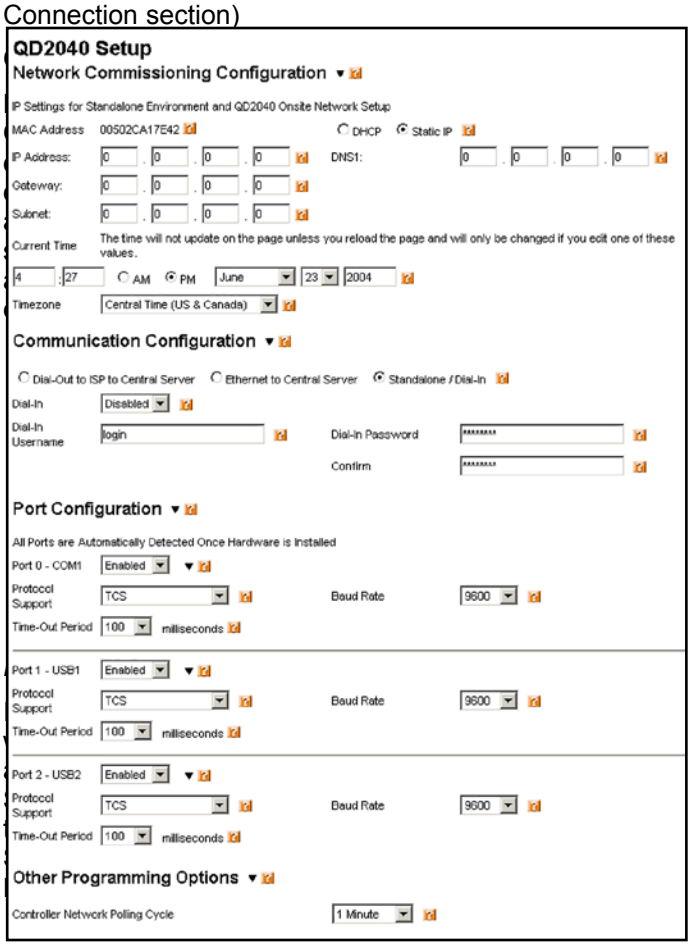
Once you have made connection and have logged in you are able to configure the operation of the unit.

To program and setup the QWL3.0 when it is in Stand-Alone / Dial-In mode click on the Admin menu and then click the QD2040 setup tab. Once on the QD2040 setup page you can begin selecting the proper parameters for your application. If the unit is in Ethernet to Central Server mode there will be no access to the menu items of the embedded Ubiquity software. In either case, all Ubiquity Application software and functionality is accessed by logging into the Central Server (*www.ubiquitysystems.net)*

NETWORK COMMISSIONING CONFIGURATION

Select whether the QWL3.0 will operate using a static IP address or DHCP addressing. When using static IP addressing as determined by the LAN/WAN network administrator, you must enter the IP address, Gateway protocol setting, Subnet setting and DNS setting. When using DHCP addressing, no further settings need to be entered in this section.

Enter correct time, date and time zone into the appropriate areas. Also located in this section is the information regarding the MAC address of the Ethernet card in the QWL3.0. This is important when matching DHCP addresses with hardware on the network (see Initial Connection section)



In this section also enter the SMTP Server settings, POP username and password and a return email address. You can also select when you want the QWL3.0 to communicate with the server by selecting Always On, Never On or Specifying the times. To specify the times, select a cycle time from the drop down menu and then select how long you want the unit to remain online from another drop down menu.

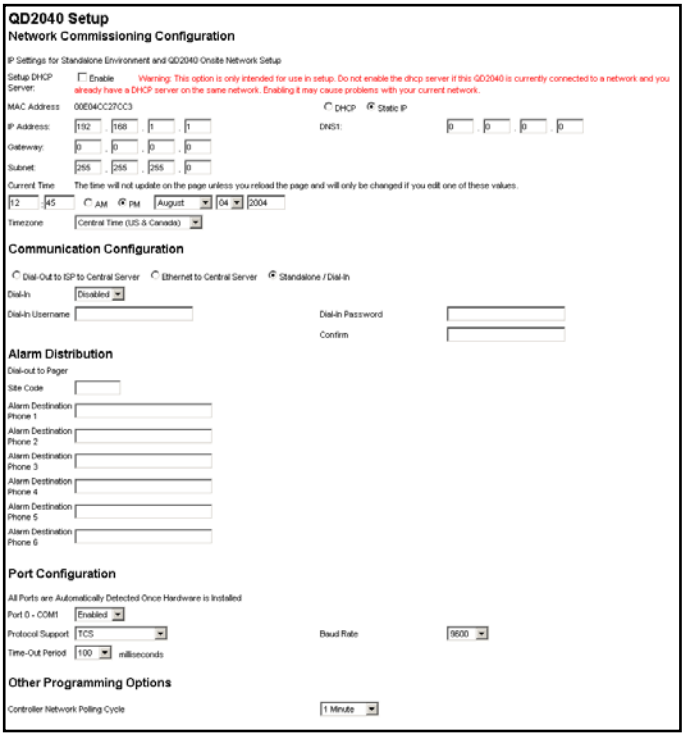
Stand-alone

Before you can setup the QWL3.0 to operate in the Stand-alone mode, you must first uncheck the default setting of 'Setup DHCP Server' option. When in Stand-alone mode, the unit functions as a self contained server to the controller network. In this mode the unit can be accessed directly via PC or can be accessed over an Ethernet.

If in either case, you will need to know the IP address needed to access the QWL3.0

(Note: This IP address is most likely different than the IP address that is used when connecting to the unit via the Ethernet port) Once on the login page, enter username: **admin** and password: **password** to login to access the local controller network.

(For additional information on using the embedded software in the QWL3.0, see the Ubiquity User Manual.)



ALARM DISTRIBUTION

You can select up to six different pager/cellphones numbers to be notified in the event of an alarm. You can enter up to six numbers to designate a Site Code. You must then enter in the destination email of up to six different

pagers/cell phones. In the event of an alarm, the QWL3.0 will email the alarm to the appropriate contact(s).

PORT CONFIGURATION

The communication ports are automatically detected once the QWL3.0 is powered up. Once detected each COM port needs to be configured to ensure proper functioning of the network on each port. Each port can be enabled or disabled from the drop down menu. You must also select the proper protocol being used on each port. The current protocol selections from the drop down menu are TCS or Modbus Veris Meter. The Modbus Veris Meter selection will support the PE Series Modbus Meters.

You must also select the communication baud rate for each port. This setting must be the same as all of the controllers on that port. You can also adjust the Time-Out Period for each port. The Time-Out Period is the amount of time, in milliseconds, that the network will wait to send information requests from the controllers on the port before it times out. If time-out errors are occurring on the network you should increase this value until there are no longer time-outs. Generally, the more controllers on a particular network, the higher this value will need to be.

OTHER PROGRAMMING OPTIONS

You must select a Network Polling Cycle Time for the QWL3.0. This is the time interval that the unit will poll the entire network of controllers on all ports

(For additional information on using the embedded software in the QWL3.0, see the Ubiquity User Manual.)

Controller Addressing

Prior to accessing controllers via the network, all controls must be programmed with the same communication baud rate as will be used for the QWL3.0. All controls must also be programmed with a unique communication address from 0 to 255 excluding 248. All controls come with a factory default address of zero. On units with displays, control addressing can be done using the keypad and display or by utilizing the QWL3.0 control addressing interface page. Controllers with no displays need to be addressed through the QWL3.0. To address via the software interface you must first follow the necessary connection procedures to access the unit (see Initial Connection section). After initial connection is established and before the controller network is attached to the QWL3.0, only one controller can be attached at a time to the unit (see Control Network Wiring and Setup section for instruction on connecting controllers to the serial or USB ports of the unit)

To access the addressing page press Controller Addressing button at the bottom of the unit Setup page. Select which port you are connected to from the drop down menu. If you know the current address of the controller, select the number from the drop down (all controllers come from the factory with a default address of 0) menu then select the new address you want to give the controller from the other drop down menu. If the current address is not known, select the desired address from the drop down menu. When finished press the submit button at the bottom of the Controller Addressing page.

Ubiquity Systems Software

The Ubiquity system addresses the market's desire for a fully integrated system in a single, customizable package. Ubiquity can function as an embedded application in the QWL3.0 or as a centrally hosted application that readily and easily interfaces with the local QWL3.0. The system is designed on a modular approach to collect and manage information and data. This strategy provides us the opportunity to effectively package a solution tailored to embrace your most immediate concerns. Plus our advanced controls and monitors, combined with this easily modified modular approach, offers the scalability to effectively meet your future demands.

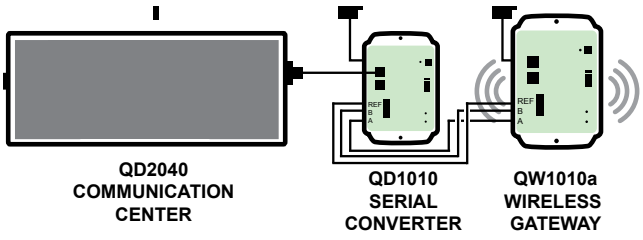
The Ubiquity systems modular design incorporates:

- Energy and environmental management
- TCS Basys Controls energy management system
- Automated lighting management
- Refrigeration and freezer monitoring and alarming
- Global scheduling, programming and alarming
- Integrated preventive and reactive maintenance functions

Refer to the Ubiquity Manual for further information

Wireless Network Setup

The QWL3.0 has a built-in ZigBee wireless gateway, also know as a QW1010A, to manage the ZigBee wireless network. This version , however, comes from the factory in the OFF position. Be sure to move the jumper into the ON position before using the ZigBee Wireless module. (see page 2 for diagram of the Wireless Gateway jumper)



Throughout the wireless setup section the terms coordinator, gateway, QW1010A, and QWL3.0 will be understood to mean the same thing and will be used interchangeably.

Location:

- A wireless network will not function correctly if it is separated by walls or other structures in which a wireless signal cannot penetrate such as steel, concrete, or rocks.

- The area containing wireless devices should be static/ non-changing, for example, do not place wireless devices behind a steel door that is open during occupied times and closed during unoccupied times.
- No part of a wireless network should be placed outdoors. The varying atmospheric conditions cause the wireless signals to distort resulting in an unstable wireless network; for example, a wireless network formed on a foggy day will have trouble communicating on a clear day and vice-versa.
- The coordinator of the wireless network should be placed at a central location with respect to the routers.
- Coordinators and routers should be placed in an area with little external wireless interference, away from other wireless devices.

Distance:

- A wireless network will not function correctly if the distance between the coordinator and/or routers exceeds approximately 150 feet line of sight. Walls and other barriers will severely limit the maximum distance.

QW1030 Panel

- Wireless networks are only able to travel a maximum of 5 hops from the coordinator; routers placed beyond the 5 hop limit will not join the network.
- Routers are only able to have 6 children each.

Special Considerations:

- A wireless network should be oriented in such a way that routers are spread out equidistant in a circular pattern from the coordinator so as to maximize the communicating area available. Routers placed in a straight line may cause network instability.
- A Universal Subsystem should never be placed on a wireless network because a subsystem is dependent on uninterrupted continuous communication.
- Only 15 routers should be placed on a single wireless network. A router is defined as a wireless thermostat, bridge, or repeater. Large networks cause the wireless communication to become unstable.
- If multiple wireless networks are present, each network should be given a separate Personal Area Network Identification (PAN ID) and wireless channel. Wireless channels should be chosen in a way so as to limit interference from other area neighbouring channels, for example, instead of using channels 11 and 12 use channels 11 and 25 or 11 and 14.

Wireless Deployment Overview:

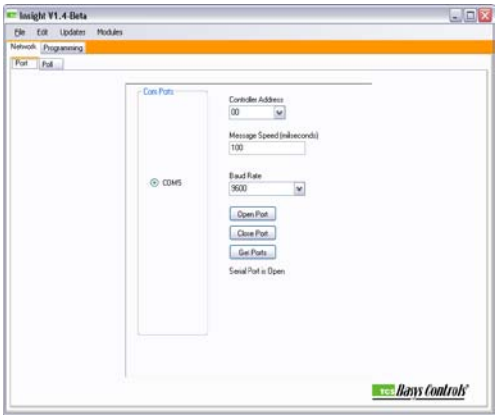
1. Power up the QW1010A/Coordinator. Important!! Do not connect the coordinator to the QD2040.
2. Set the desired network PAN ID and Channel on the Coordinator.
3. Move the thermostat/router to the installation location.
4. Power up the wireless thermostat/router with the wireless module removed.
5. Set a unique TCS address on the router.
6. Remove power from the wireless thermostat/router and install the wireless module.
7. Power up the wireless router.
8. Repeat steps 2-6 for all the wireless routers on the network, being sure that each router has a unique TCS address. Install the routers so that each anticipated first hop is powered first, followed by the anticipated second hops, etc.

Start Insight by clicking on the icon on the desktop or going to:

Start->All Programs-> TCS Basys Controls->Insight

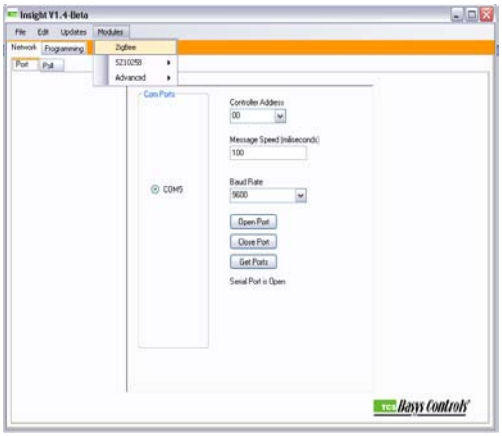
Insight Startup Window

Select a serial port from the list displayed and select the Open Port button. Leave the controller address and message speed box at their default.



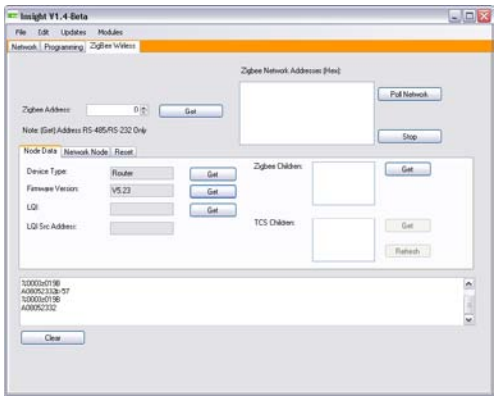
Opening ZigBee Module Tab

Select Modules from the menu, then select ZigBee from the drop down list. A new tab will be added to the tab list named ZigBee Wireless.



Retrieve Router Information

After the router has a unique TCS address, connect the QD1010 to each router using the RS485 via phone jack or terminal blocks located on the bottom board. Select the “Get” button for the Device Type and Firmware Version, verify that it displays router and the current firmware version as shown.

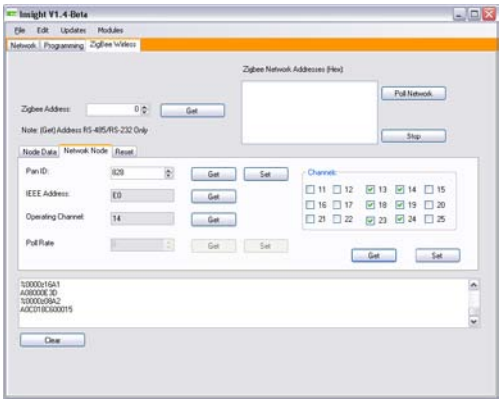


Set PAN ID and Channel for Wireless Network

On the Network Node tab set the PAN ID on each router to that of your network. In this example, the PAN ID is set to 828. It is important that each router and the gateway be set to the same PAN ID otherwise nodes will not be able to join the wireless network. A different PAN ID should be given to each wireless network in a given area.

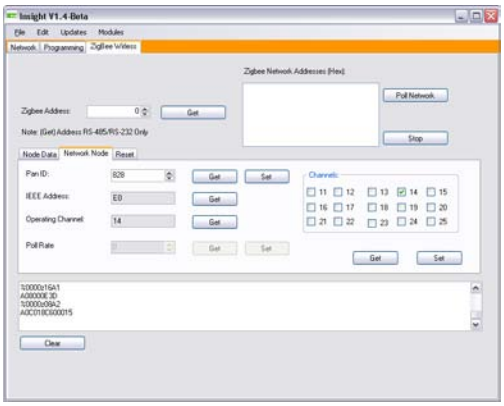
Hit the set button once you have set the PAN ID, hit the get button to verify that it was successfully set.

It is a good idea to record the IEEE Address of each of your routers for future reference.



Set Channel List for Wireless Network

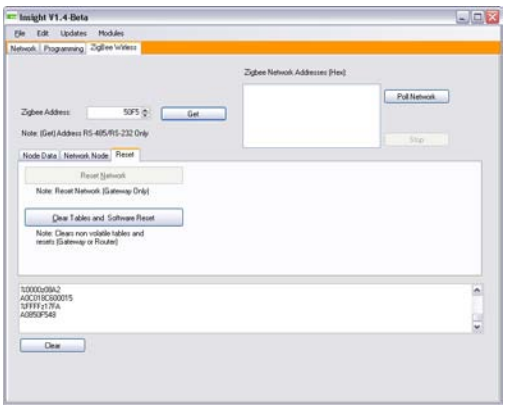
Get the channel list, and set the channels you want the wireless network to be able to use. If only a single wireless network is present, the network will automatically pick the best channel among the channels that you have selected. To force the network to use a specific channel select only one channel from the list. Hit the set button, then the Get button to verify the channel list you have selected.



Reset Device

Once the router PAN ID and wireless channel have been set correctly, select the Reset tab and click on the “Clear Tables and Software Reset” button. Resetting the Router/Gateway will save the settings programmed into it.

Each time the network, PAN ID, Channel list, etc have changed a “Clear Tables and Software Reset” is required to accept the changes.

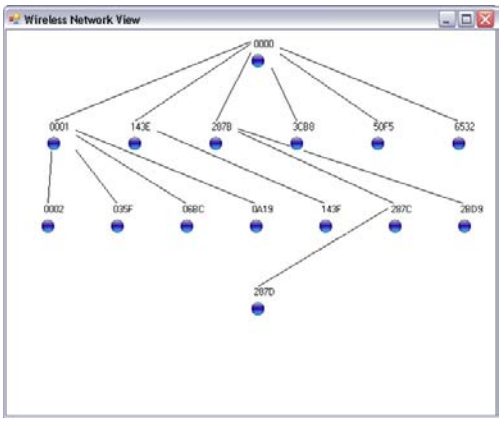


Set the PAN ID and channel list for each device in the wireless network. Once all the routers have been programmed and the network has had enough time to form (approximately 2 min for each node), connect the QW1010 to the computer running the Insight software. In the wireless module tab, click the “Poll Network” button. A network view window will pop up. After the network view window has loaded fully (approximately 30 seconds) it should look similar to the picture. The blue dots displayed on the network view window represent the wireless nodes on the network. By hovering the mouse pointer over each node it is possible to see the TCS as well as ZigBee address. If a node does not have a valid TCS address or is a repeater, it will be displayed in a yellow green color. If all the nodes in the wireless network are accounted for and show up in blue, then the wireless network is functioning correctly and the Coordinator can be connected to the QD2040.

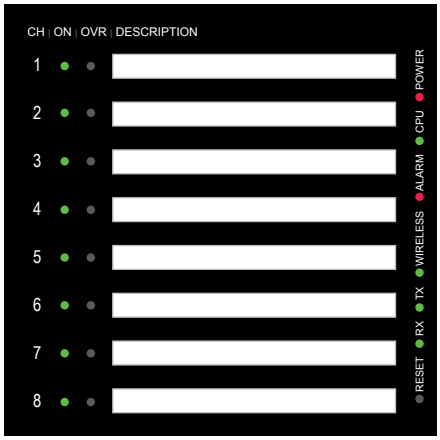
Wireless Network View

The ZigBee tree will also be displayed as a list view in the ZigBee tab. When an address is selected from the network list that nodes, children can be displayed by pressing the get button next to the ZigBee children box.

When one of the ZigBee addresses is selected in the poll network box it will appear in the ZigBee address section of the page. Once the address is displayed in the ZigBee Address box that addresses device type, firmware version, LQI, etc. can be retrieved by hitting the associated get button.



LED Display and Push Buttons



Fourteen LEDs on the QWL 3.0 allow the user to view the current operating status of the QWL 3.0.

DIGITAL OUTPUTS: Along the Left hand side there are Eight LEDs and Push button

- The LEDs will be lit when the corresponding relay output is occupied, or physically on no matter if the channel is selected to be NO or NC.
- The pushbuttons correspond to each of the channels for the timed override function.

DATA: Along the Right hand side towards the bottom, there are three LEDs

- The RX LED indicated that the hard wired RS485 network is in Receive mode.
- The TX LED indicated that the hard wired RS485 network is in transmit mode.
- The Wireless LED indicates activity on the ZigBee wires network.

ALARM: This LED indicates that a local alarm is active

POWER: This LED indicated that the QWL 3.0 has power applied

- The reset button in the lower right hand corner is used to “reboot” the entire QWL 3.0 panel. This is accomplished by pushing and holding the button for 5-7 seconds. Please note: The lights associated with the Lighting Module of this product could go out, it is recommended that you open the panel and place the Hand-Off-Auto switch for the corresponding channel in the Hand position to ensure that the lights that should be on remain on.

CPU: This LED indicates that the CPU or QD2040 portion of the panel is active and running.

Checkout & Troubleshooting

QWL3.0

- Be sure to check and verify all wiring before powering up the QWL 3.0
- Be sure that if you drilled any holes and created metal shaving that they are all cleaned up and in a position to allow for shorting before powering up.

Lighting Module - SLQ218

- Verify all wiring before powering up the QWL 3.0 and the SLQ218.
- Place the Hand-Off-Auto switches in the off position
- Place the appropriate (Normally Open) NO or (Normally Closed) NC jumpers (both included) in position-RED wires = NO-ON=Closed and BLACK wires=NC-On=Open

Utility Meter Pulse transducer Module - SEQ100

- Verify all wiring prior to powering the QWL 3.0 and SEQ100.
- Take note of the current readings for all meters. Since the SEQ100 is used for only monitoring, and is the reading appear to be correct, you are done.
- If a value does not appears to be correct, verify on the programming page the value programmed in is correct.
- If a value is shown as 0 (Zero) the SEQ100 is not receiving a pulse signal.

Site Communications Center - QD2040

- Be sure to verify all wiring and programming information before hooking up to Network
- If the CPU LED does not light up, verify that the power supply nodule (included with the QWL 3.0) is plugged in to an outlet that has power.

  If you have the Power Supply plugged into a UPS (Uninterruptable Power Supply - PK3000 or PK3100) make sure the UPS is turned on.

RS232/RS485 Communications Convertor - QD1010

Once a network is wired, you should test communications with all controllers on the network. Find out which controllers communicate and which ones don't. Go to the controllers that don't communicate and verify that the "A" and "B" wires are not switched. Verify the address and the baud rate as well. One of these three things is usually the problem. (see chart below)

IF	THEN
Tx LED blinks, Rx LED is always off. If this happens, the computer is sending, but the controller is not responding.	Check that the baud rate set on the controller(s) are all set the same. Verify controller address.
Both Tx and Rx LEDs will blink. Both the computer and the controller are responding, but you still receive communication errors.	Check wiring. Make sure that communication wiring runs are at least 5' away from fluorescent lights, motors, etc. Make sure that all controllers on a network have a unique address.
Rx LED is always on. This is typically a problem with wiring.	Make sure that the "A" and "B" wires are not switched or shorted. Make sure that there is no stray voltage on the "A" and "B" wires. "B" to "A" should measure between 0.5 VDC and 3.6 VDC. "B" to "A" should measure 0 VAC. "A" to "Shield" and "B" to "Shield" should measure 0 VAC and 0 VDC.
Communication errors/problems.	On smaller networks, try removing one of the two terminating resistors.